(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 038 111 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
20.07.2016 Bulletin 2016/29

(21) Application number: **07720028.5**

(22) Date of filing: **19.06.2007**

(51) Int Cl.:
B29C 65/70 *(2006.01)* ***E05B 3/00*** *(2006.01)*
B29C 45/00 *(2006.01)* ***E05B 17/00*** *(2006.01)*
B29L 31/22 *(2006.01)*

(86) International application number:
PCT/CA2007/001113

(87) International publication number:
WO 2007/147253 (27.12.2007 Gazette 2007/52)

(54) **METHOD OF MOLDING INTEGRAL JOINT**

VERFAHREN ZUM FORMEN EINER INTEGRALEN VERBINDUNG

PROCÉDÉ DE MOULAGE DE JOINT INTÉGRÉ

(84) Designated Contracting States:
DE FR GB

(30) Priority: **20.06.2006 US 815524 P**

(43) Date of publication of application:
25.03.2009 Bulletin 2009/13

(73) Proprietor: **Magna Closures Inc.**
Newmarket, ON L3Y 4X7 (CA)

(72) Inventors:
- **BROADHEAD, Douglas, G.**
Brampton, Ontario L6Z 4P1 (CA)
- **MIU, Traian**
Mississauga, Ontario L5B 3W4 (CA)

(74) Representative: **Hössle Patentanwälte Partnerschaft**
Postfach 10 23 38
70019 Stuttgart (DE)

(56) References cited:
WO-A1-01/89795
US-A- 4 343 501
US-A- 5 372 491
US-A- 5 895 081
US-A- 6 036 244
US-A1- 2004 195 721

EP 2 038 111 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of the Invention

[0001] The invention relates to a method of molding an integral joint. More particularly, the invention relates to a method of molding an integral joint including an enclosure rotatable about a stationary member.

Description of Related Art

[0002] Molded articles are currently utilized in a wide variety of industries. Many of these molded articles include a joint or similar structure for connecting a first part to a second part. Typically, these joints have been formed with two distinct parts. First, a fixed member is molded into place. Then, a second molded member is secured to the fixed member. This two part process requires the use of fasteners or adhesives as well as secondary molding and installation operations.

[0003] WO 01I/89795 A1 discloses an improved hinge construction comprising a first hinge portion pivoted to a second hinge portion according to a pivoting axis, and being characterized in that it comprises a central portion coupled to the first portion and comprising two axial elements, extending from the central portion in opposite directions substantially coaxial with the pivot axis. The axial elements are engaged in respective annular portions formed as a single body with the second portion. The first and second portions, the central portion, the axial elements and annular portions are all made by injection molding in a single injection step.

[0004] US 2004/0195721 A1 discloses a method of two-stage injection molding of an air conditioner outlet vent device, the device including a housing, a plurality of blades pivotably supported by the housing and disposed in parallel to each other within the housing, and a link operatively connecting the blades. The plurality of blades are injection-molded in a secondary injection step subsequent to a primary injection step in which the housing is molded. In the secondary injection step, a molten resin is injected into cavities formed within a mold device in a closed mold state from a plurality of gates provided in portions of the mold device corresponding to projections of the blades.

Summary of the Invention

[0005] According to one aspect of the invention, a method is provided for molding an integral joint according to the features of claim 1.

Brief Description of the Drawings

[0006] The invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is a perspective view of a molded, integral joint for connecting first and second parts;

Figure 2 is a another perspective view of the molded, integral joint connecting first and second parts;

Figure 3 is a perspective view, partially cut away, of a stationary member of the integral joint;

Figure 4 is an exploded, perspective view of a joint formation assembly for molding the integral joint;

Figure 5 is an exploded, perspective view of the joint formation assembly;

Figure 6 is a perspective view of the joint formation assembly in a ready position;

Figure 7 is a perspective view of the joint formation assembly in the ready position; and

Figure 8 is a top view of the integral joint.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0007] Referring to Figures 1 through 3, a molded, integral joint, generally shown at 10, connects first 12 and second 14 parts such that the second part 14 is rotatable relative to the first part 12. The integral joint 10 may be formed by injection molding or injection-compression molding. In the present embodiment, the first part 12 is a semi-structural panel for a motor vehicle and the second part 14 is a vehicle door handle assembly. It is, however, appreciated that the first 12 and second 14 parts may be any of numerous structures for use in any of a variety of industries.

[0008] The integral joint 10 includes a stationary member 16 extending between opposing ends 18, 20. A first tab 22 extends between one end 18 of the stationary member 16 and the first part 12. A second tab 24 is spaced apart from the first tab 22 and extends between the opposing end 20 of the stationary member 16 and the first part 12. Thus, the first 22 and second 24 tabs connect the stationary member 16 to the first part 12. The first 22 and second 24 tabs are offset from one another along the stationary member 16. It is appreciated that the shape of the first 22 and second 24 tabs may vary.

[0009] A rotatable member or enclosure 28 extends out from one end of the second part 14. The rotatable member 28 surrounds the stationary member 16 and is free to rotate relative thereto. More specifically, the rotatable member 28 is not secured or attached to the stationary member 16 or to the first 22 and second 24 tabs. The rotatable member 28 is maintained along the stationary member 16 by the first 22 and second 24 tabs.

[0010] The particular structure, configuration, and size of the stationary 16 and rotatable 28 members may vary.

In accordance with these variations, one may vary a space 29 (shown in Figure 8) between the stationary 16 and rotatable 28 members to increase or decrease the ability of the rotatable member 28 to rotate about the stationary member 16.

[0011] A method of molding the integral joint 10 is now described with reference to Figures 4 through 8. The method of molding the integral joint 10 utilizes a joint formation assembly, generally shown at 30, including a plurality of slides 32, 34, 36, 38. In the present embodiment, the plurality of slides includes first 32 and second 34 central slides and first 36 and second 38 end slides. When all of the slides 32, 34, 36, 38 are moved into a ready position, as shown in Figures 6 and 7, moldable material is injected into the joint formation assembly 30 to form the integral joint 10.

[0012] Referring now to Figures 4 and 5, the first central slide 32 includes an inboard surface 40 defining an outer cavity half 42. The second central slide 34 includes an inboard surface 44 defining an outer cavity half 46. In the present embodiment, each of the outer cavity halves 42, 46 has a semi-circular shape. The second central slide 34 also includes a top surface 48 defining a passageway 50. The passageway 50 is fluidly connected to the outer cavity half 46.

[0013] When the joint formation assembly 30 is in the ready position, as shown in Figures 6 and 7, the first 32 and second 34 central slides are moved against one another so that the inboard surfaces 40, 44 abut one another. At this time, the outer cavity halves 42, 46 are aligned with one another to form a continuous outer cavity 52, as shown in Figure 6. Moldable material is introduced into the passageway 50 to fill the entire outer cavity 52 and eventually form the rotatable member or enclosure 28.

[0014] Referring back to Figures 4 and 5, each of the first 32 and second 34 central slides also includes an inner cavity portion 54, 56 that is divorced from the respective outer cavity half 42, 46 by a separating wall 59. Each inner cavity portion 54, 56 extends between opposing ends 60, 62.

[0015] The first end slide 36 includes an inboard surface, generally indicated at 64, extending between an upper end 66 and a lower end 68. The inboard surface 64 defines an inner cavity portion 70 along the lower end 68. The inner cavity portion 70 is continuous with the inner cavity portion 56 of the second central slide 34. In addition, when the joint formation assembly 30 is in the ready position, the inner cavity portion 70 closes around the inner cavity portion 54 at the end 60 thereof. The inboard surface 64 further defines an end cavity 72 that is shaped to form the tab 22. A passageway 74 is formed in the first end slide 36 for receiving moldable material that will eventually enter the inner cavity portions 54, 56 in order to form the stationary member 16.

[0016] The inboard surface 64 of the first end slide 36 also includes end portions 76, 78 on either side of the inner cavity portion 70. When the joint formation assembly 30 is in the ready position, as shown in Figures 6 and 7, the end portions 76, 78 abut the top surface 48 of the second central slide 34 to seal off the outer cavity half 46 and the passageway 50. As a result, moldable material entering the outer cavity half 46 from the passageway 50 is prevented from entering the inner cavity half 70 and the end cavity 72. Thus, the outer cavity half 46 is completely divorced from the inner cavity portions 56, 70.

[0017] The second end slide 38 also includes an inboard surface 80 extending between an upper end 82 and a lower end 84. The inboard surface 80 defines an inner cavity portion 86 along the upper end 82. The inner cavity portion 86 is continuous with the inner cavity portion 54 of the first central slide 32. Together, the inner cavity portions 54, 56, 70, 86 form an inner cavity 87. When the joint formation assembly 30 is in the ready position, the inner cavity portion 86 closes around the inner cavity portion 56 at the end 60 thereof. The inboard surface 80 further defines an end cavity 88 that is shaped to form the tab 24.

[0018] The inboard surface 80 of the second end slide 38 also includes end portions 90, 92 on either side of the inner cavity portion 86. When the joint formation assembly 30 is in the ready position, as shown in Figures 6 and 7, the end portions 90, 92 abut a bottom surface 94 of the first central slide 32 to seal off the outer cavity half 42. As a result, moldable material entering the outer cavity half 42 is prevented from entering the inner cavity portion 86 and the end cavity 88. Thus, the outer cavity half 42 is completely divorced from the inner cavity portions 54, 86. Because the outer cavity halves 46, 42 are divorced from the respective inner cavity portions 56, 70 and 54, 86, moldable material entering the outer cavity 48 from the passageway 50 is separated from moldable material entering the inner cavity portions 54, 56, 70, 86 and the end cavities 72, 88 from the passageway 74, which in turn allows the independent formation of the rotatable member 28 along the stationary member 16. It is this independent formation of the rotatable member or enclosure 28 that allows for rotation thereof about the stationary member 16.

[0019] It is contemplated that although a particular structure for the plurality of slides 32, 34, 36, 38 has been shown and described for forming the integral joint 10, the shape, size, configuration, and number of slides may vary depending upon the specific stationary and rotatable members to be molded.

[0020] In operation, the molding of the integral joint 10 begins with the movement of the joint formation assembly 30 into the ready position, shown in Figures 6 and 7. Moldable material is introduced into the first end slide 36 via the passageway 74. The moldable material fills the end cavities 72, 88 and the inner cavity portions 54, 56, 70, 86, which together form the inner cavity 87. The moldable material in the inner cavity 87 and the end cavities 72, 88 forms the stationary member 16 and the tabs 22, 24, respectively. Moldable material is also introduced into the second central slide 34 via the passageway 50. The

moldable material fills the outer cavity 52 to form the rotatable member 28. It is appreciated that different moldable materials may be utilized to form the stationary member 16 and the rotatable member 28. The separating wall 59 and the end portions 76, 78, 90, 92 prevent the moldable material in the outer cavity 52 from entering the inner cavity 87. Thus, the rotatable member 28 independently and separately forms around the stationary member 16, which allows rotation of the rotatable member 28 about the stationary member 16. The end result is a permanent and flexible connection between the first part 12 and the second part 14.

[0021] The particular order in which the rotatable member or enclosure 28 and the stationary structure 16 are molded may vary. More specifically, the molding of the rotatable member or enclosure 28 and the stationary member 16 can occur either simultaneously or sequentially.

[0022] The invention has been described in an illustrative manner. It is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the invention are possible in light of the above teachings. Therefore, within the scope of the appended claims, the invention may be practiced other than as specifically described.

Claims

1. A method of molding an integral joint including a stationary member (16) connected to a first part (12) by spaced apart tabs (22, 24) and an enclosure (28) extending out from a second part (14) and rotatable about the stationary member (16) between the spaced apart tabs (22, 24), said method comprising the steps of:

   providing a joint formation assembly that includes first (32) and second (34) central slides and first (36) and second (38) end slides, wherein the first central slide (32) defines a first outer cavity half (42) and the second central side (34) defines a second outer cavity half (46), wherein each of the first (32) and second (34) central slides further defines an inner cavity portion (54, 56) that is divorced from the respective outer cavity half (42, 46) by a separating wall (59), wherein the first end slide (36) defines an inner cavity portion that is continuous with the inner cavity portion of the second central slide, and wherein the first end slide further defines a first end cavity (72) that is shaped to form a first tab (22), wherein the first end slide (36) seals off the second outer cavity half (46), wherein the second end slide (33) defines an inner cavity portion (86) that is continuous with the inner cavity portion (54) of the first central slide (32) such that the inner cavity portions (54, 56, 70, 86) together form an inner cavity (87), wherein the second end slide (38) further defines a second end cavity (88) that is shaped to form a second tab (24), wherein the second end slide (38) seals off the first outer cavity half (42) to divorce the inner cavity (87) and end cavities (72, 88) from the outer cavity (52);
   introducing moldable material into the inner cavity (87) from a first passageway (74);
   filling the inner cavity (87) with moldable material to form the stationary member (16);
   filling the end cavities (72, 88) with moldable material to form the tabs (22, 24) integral with the stationary member (16);
   introducing moldable material into the outer cavity (52) from a second passageway (50);
   filling the outer cavity (52) witch moldable material to form the enclosure (28); and
   forming the stationary member and the tabs, separately and independently forming the enclosure (28) around the stationary member (16) and between the tabs (22, 24) to allow rotatable movement of the enclosure (28) relative to the stationary member (16).

2. The method of molding as set forth in claim 1 wherein the step of introducing moldable material into the inner cavity (87) from the first passageway (74) to form the stationary member (16) includes the step.of filling the inner cavity (87) and end cavities (72, 88) with a first moldable material and the step of introducing moldable material into the outer cavity (52) from the second passage-way (50) to form the enclosure (28) includes the step of filling the outer cavity (52) with a second moldable material different from the first moldable material.

3. The method of molding as set forth in claim 1 wherein the steps of forming the stationary member (16) and forming the enclosure (28) occur simultaneously.

4. The method of molding as set forth in claim 1 wherein the steps of forming the stationary member (16) and forming the enclosure (28) occur sequentially.

5. The method of molding as set forth in claim 1 including the step of varying a space (29) between the inner and outer cavities (87, 52) to increase or decrease the ability of the enclosure (28) to rotate about the stationary member (16).

Patentansprüche

1. Verfahren zum Formen einer integralen Verbindung, die ein feststehendes Element (16), das mit einem ersten Teil (12) durch beabstandete Platten (22, 24)

verbunden ist, und ein Gehäuse (28) das sich von einem zweiten Teil (14) erstreckt und um das feststehende Element (16) zwischen den beabstandeten Platten (22, 24) drehbar ist, enthält, wobei das Verfahren die folgenden Schritte aufweist:

Bereitstellen einer Verbindungsbildungsanordnung, die einen ersten (32) und zweiten (34) zentralen Schieber und einen ersten (36) und zweiten (38) Endschieber enthält, wobei der erste zentrale Schieber (32) eine erste Außenhohlraumhälfte (42) definiert und der zweite zentrale Schieber (34) eine zweite Außenhohlraumhälfte (46) definiert, wobei jeder von dem ersten (32) und zweiten (34) zentralen Schieber ferner einen Innenhohlraumabschnitt (54, 56) definiert, der von der entsprechenden Außenhohlraumhälfte (42, 46) durch eine Trennwand (59) getrennt ist, wobei der erste Endschieber (36) einen Innenhohlraumabschnitt definiert, der eine Fortsetzung des Innenhohlraumabschnitts des zweiten zentralen Schiebers ist, und wobei der erste Endschieber ferner einen ersten Endhohlraum (72) definiert, der so gestaltet ist, dass er eine erste Platte (22) bildet, wobei der erste Endschieber (36) die zweite Außenhohlraumhälfte (46) abdichtet, wobei der zweite Endschieber (38) einen Innenhohlraumabschnitt (86) definiert, der eine Fortsetzung des Innenhohlraumabschnitts (54) des ersten zentralen Schiebers (32) ist, sodass die Innenhohlraumabschnitte (54, 56, 70, 86) gemeinsam einen Innenhohlraum (87) bilden, wobei der zweite Endschieber (38) ferner einen zweiten Endhohlraum (88) definiert, der so gestaltet ist, dass er eine zweite Platte (24) bildet, wobei der zweite Endschieber (38) die erste Außenhohlraumhälfte (42) abdichtet, um den Innenhohlraum (87) und die Endhohlräume (72, 88) vom Außenhohlraum (52) zu trennen;
Einführen von formbarem Material aus einem ersten Durchlass (74) in den Innenhohlraum (87);
Füllen des Innenhohlraums (87) mit formbarem Material zum Bilden des feststehenden Elements (16);
Füllen der Endhohlräume (72, 88) mit formbarem Material zum einstückigen Bilden der Platten (22, 24) mit dem feststehenden Element (16);
Einführen von formbarem Material aus einem zweiten Durchlass (50) in den Außenhohlraum (52);
Füllen des Außenhohlraums (52) mit formbarem Material zum Bilden des Gehäuses (28); und
Bilden des feststehenden Elements und der Platten getrennt und unabhängig, Bilden des Gehäuses (28) um das feststehende Element (16) und zwischen den Platten (22, 24), um eine Drehbewegung des Gehäuses (28) relativ zum feststehenden Element (16) zu gestatten.

2. Verfahren zum Formen nach Anspruch 1, wobei der Schritt des Einführens von formbarem Material aus dem ersten Durchlass (74) in den Innenhohlraum (87) zum Bilden des feststehenden Elements (16) den Schritt des Füllens des Innenhohlraums (87) und der Endhohlräume (72, 88) mit einem ersten formbaren Material enthält und der Schritt des Einführens von formbarem Material aus dem zweiten Durchlass (50) in den Außenhohlraum (52) zum Bilden des Gehäuses (28) den Schritt des Füllens des Außenhohlraums (52) mit einem zweiten formbaren Material enthält, das sich vom ersten formbaren Material unterscheidet.

3. Verfahren zum Formen nach Anspruch 1, wobei die Schritte des Bildens des feststehenden Elements (16) Bildens des Gehäuses (28) gleichzeitig stattfinden.

4. Verfahren zum Formen nach Anspruch 1, wobei die Schritte des Bildens des feststehenden Elements (16) Bildens des Gehäuses (28) der Reihe nach stattfinden.

5. Verfahren zum Formen nach Anspruch 1, enthaltend den Schritt des Variierens eines Raums (29) zwischen dem Innen- und Außenhohlraum (87, 52) zum Erhöhen oder Verringern der Fähigkeit des Gehäuses (28), um das feststehende Element (16) zu drehen.

Revendications

1. Procédé pour mouler un joint intégré comprenant un élément fixe (16) raccordé à une première partie (12) par des languettes (22, 24) espacées et une enceinte (28) s'étendant à partir d'une seconde partie (14) et pouvant tourner autour de l'élément fixe (16) entre les languettes (22, 24) espacées, ledit procédé comprenant les étapes consistant à:

prévoir un ensemble de formation de joint qui comprend des première (32) et seconde (34) coulisses centrales et des première (36) et seconde (38) coulisses d'extrémité, dans lequel la première coulisse centrale (32) définit une première moitié de cavité externe (42) et la seconde coulisse centrale (34) définit une seconde moitié de cavité externe (46), dans lequel chacune des première (32) et seconde (34) coulisses centrales définit en outre une partie de cavité interne (54, 56) qui est séparée de la moitié de cavité externe (42, 46) respective par une paroi de sé-

paration (59), dans lequel la première coulisse d'extrémité (36) définit une partie de cavité interne qui est continue avec la première partie de cavité interne de la seconde coulisse centrale, et dans lequel la première coulisse d'extrémité définit en outre une première cavité d'extrémité (72) qui est formée afin de former une première languette (22), dans lequel la première coulisse d'extrémité (36) scelle la seconde moitié de cavité externe (46), dans lequel la seconde coulisse d'extrémité (38) définit une partie de cavité interne (86) qui est continue avec la partie de cavité interne (54) de la première coulisse centrale (32) de sorte que les parties de cavité internes (54, 56, 70, 86) forment ensemble une cavité interne (87), dans lequel la seconde coulisse d'extrémité (38) définit en outre une seconde cavité d'extrémité (88) qui est formée afin de former une seconde languette (24), dans lequel la seconde coulisse d'extrémité (38) scelle la première moitié de cavité externe (42) pour séparer la cavité interne (87) et les cavités d'extrémité (72, 88) de la cavité externe (52);
introduire un matériau moulable dans la cavité interne (87) par une première voie de passage (74);
remplir la cavité interne (87) avec le matériau moulable afin de former l'élément fixe (16);
remplir les cavités d'extrémité (72, 88) avec le matériau moulable afin de former les languettes (22, 24) solidaires avec l'élément fixe (16);
introduire le matériau moulable dans la cavité externe (52) par une seconde voie de passage (50);
remplir la cavité externe (52) avec le matériau moulable afin de former l'enceinte (28); et
former l'élément fixe et les languettes séparément et indépendamment former l'enceinte (28) autour de l'élément fixe (16) et entre les languettes (22, 24) pour permettre le mouvement de rotation de l'enceinte (28) par rapport à l'élément fixe (16).

2. Procédé de moulage selon la revendication 1, dans lequel l'étape consistant à introduire le matériau moulable dans la cavité interne (87) par la première voie de passage (74) afin de former l'élément fixe (16) comprend l'étape consistant à remplir la cavité interne (87) et les cavités d'extrémité (72, 88) avec un premier matériau moulable et l'étape consistant à introduire le matériau moulable dans la cavité externe (52) par la seconde voie de passage (50) afin de former l'enceinte (28) comprend l'étape consistant à remplir la cavité externe (52) avec un second matériau moulable différent du premier matériau moulable.

3. Procédé de moulage selon la revendication 1, dans lequel les étapes consistant à former l'élément fixe (16) et former l'enceinte (28) se produisent simultanément.

4. Procédé de moulage selon la revendication 1, dans lequel les étapes consistant à former l'élément fixe (16) et à former l'enceinte (28) se produisent de manière séquentielle.

5. Procédé de moulage selon la revendication 1, comprenant l'étape consistant à modifier un espace (29) entre les cavités interne et externe (87, 52) pour augmenter ou diminuer la capacité de l'enceinte (28) à tourner autour de l'élément fixe (16).

FIG - 1

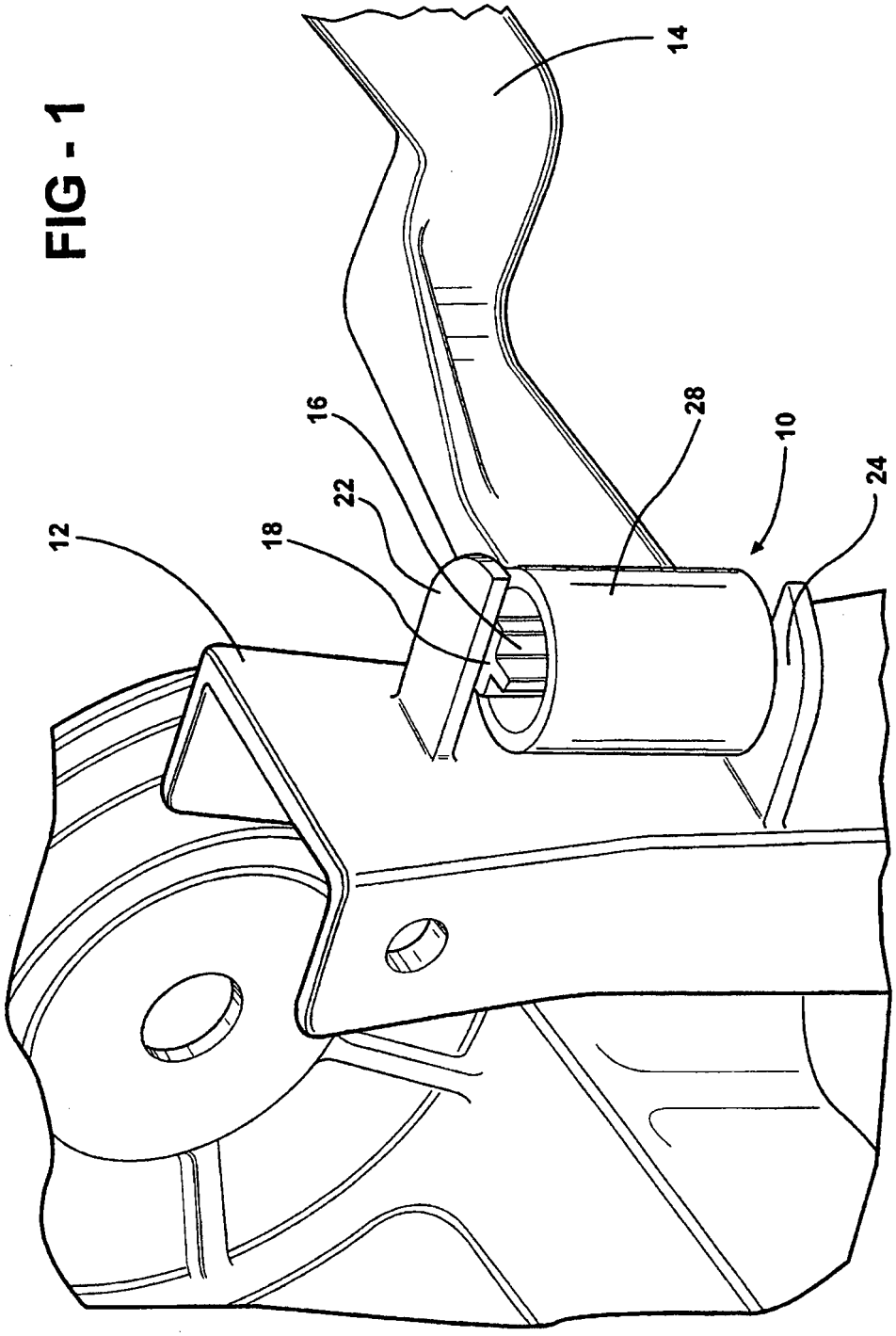


FIG - 2

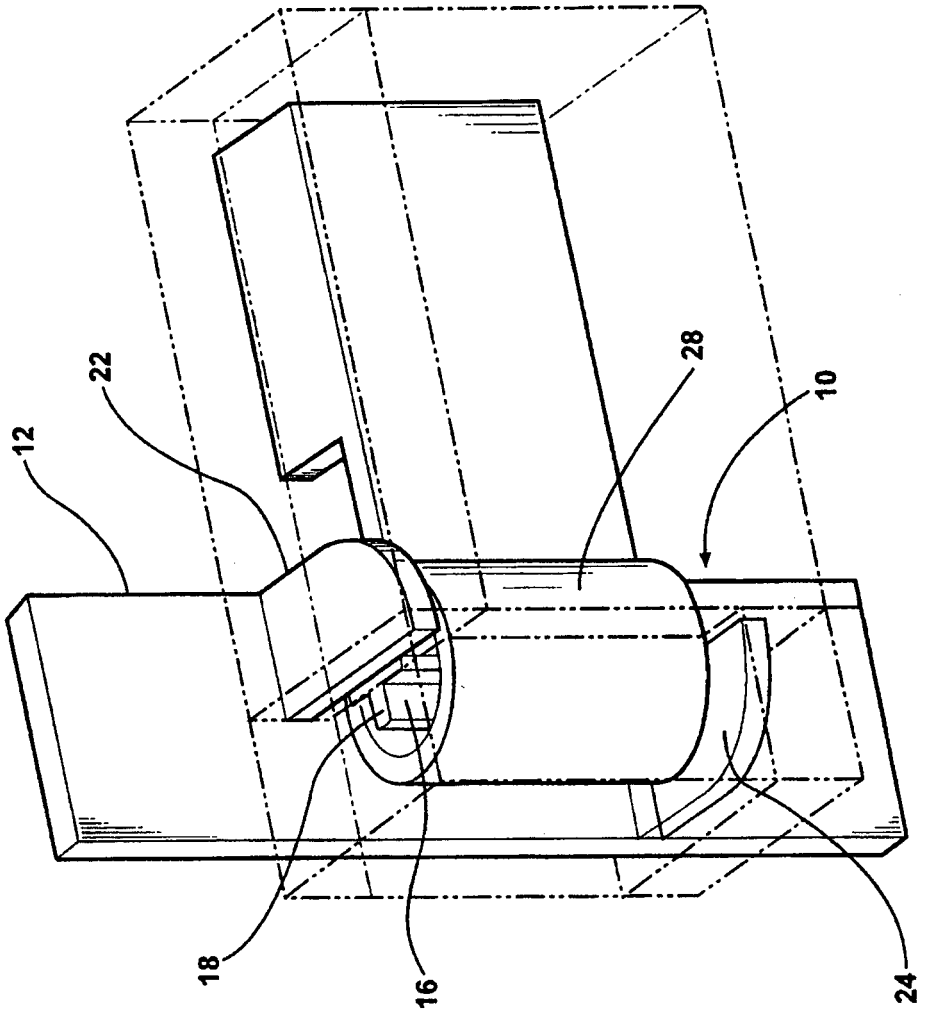
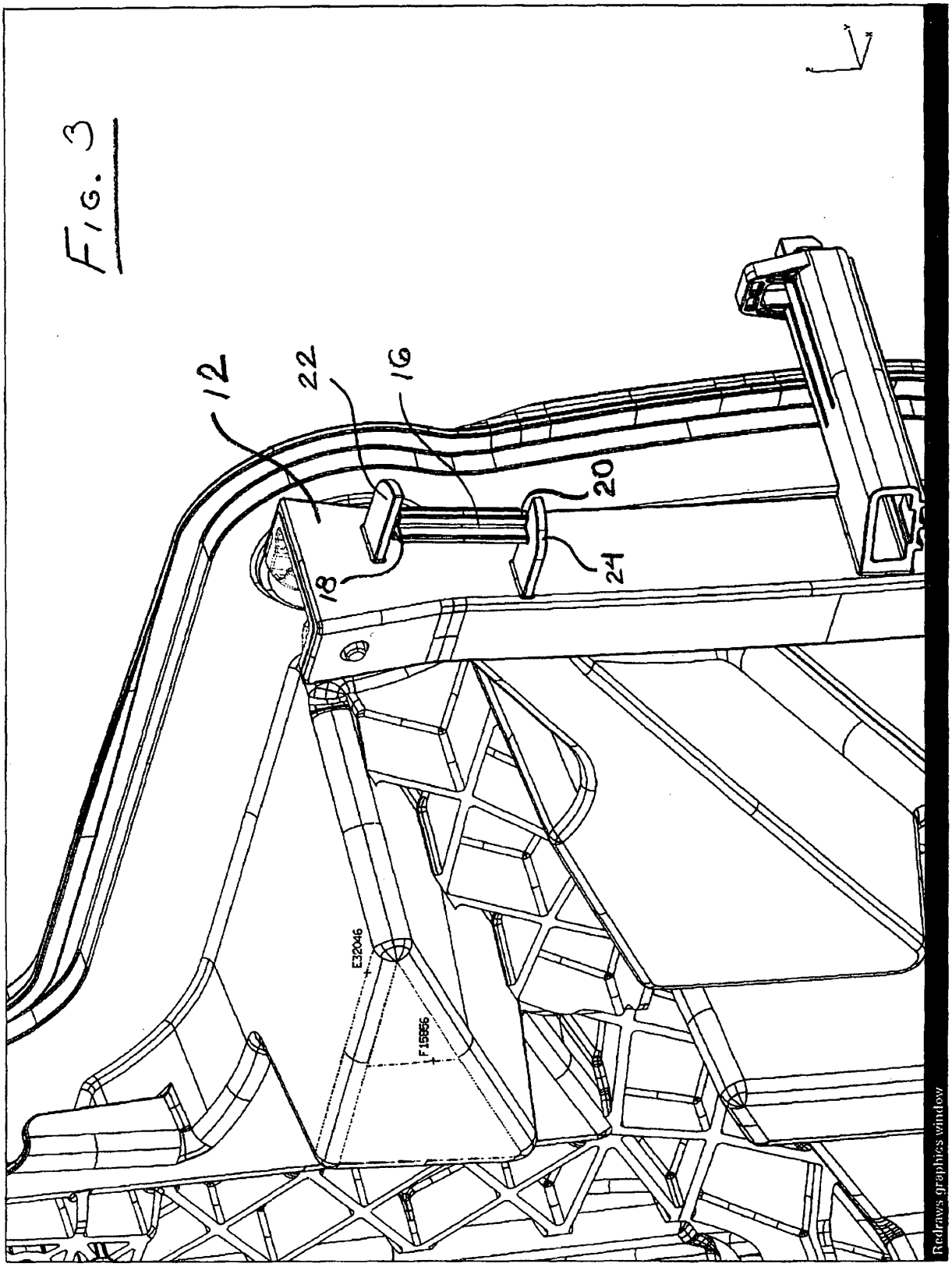


FIG. 3



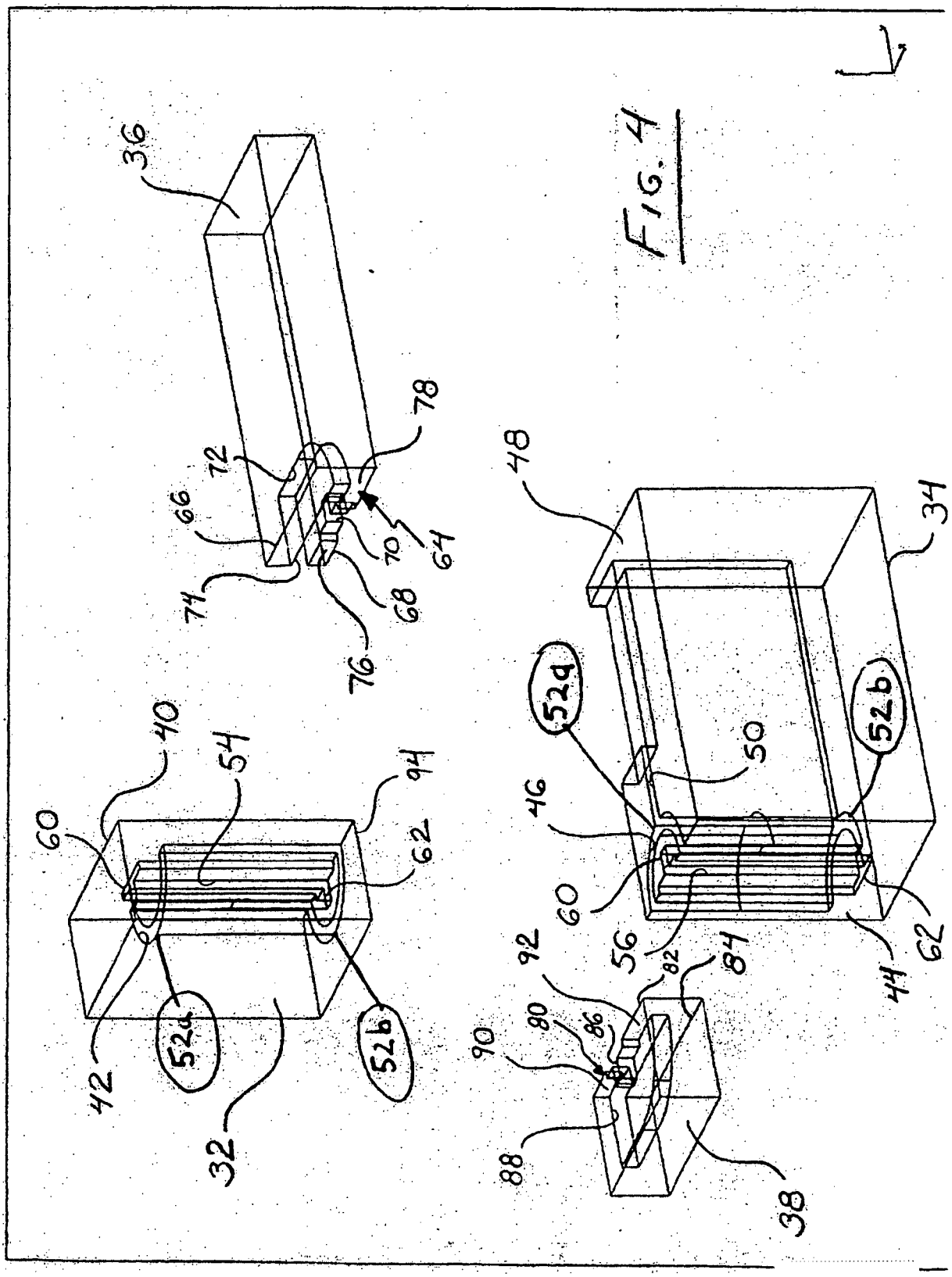

36
78
72
66
70
64
74
68
76
40
54
94
60
62
42
52a
52b
32
48
34
52a
50
52b
46
60
56
82
84
62
44
92
90
80
86
88
38

FIG. 4

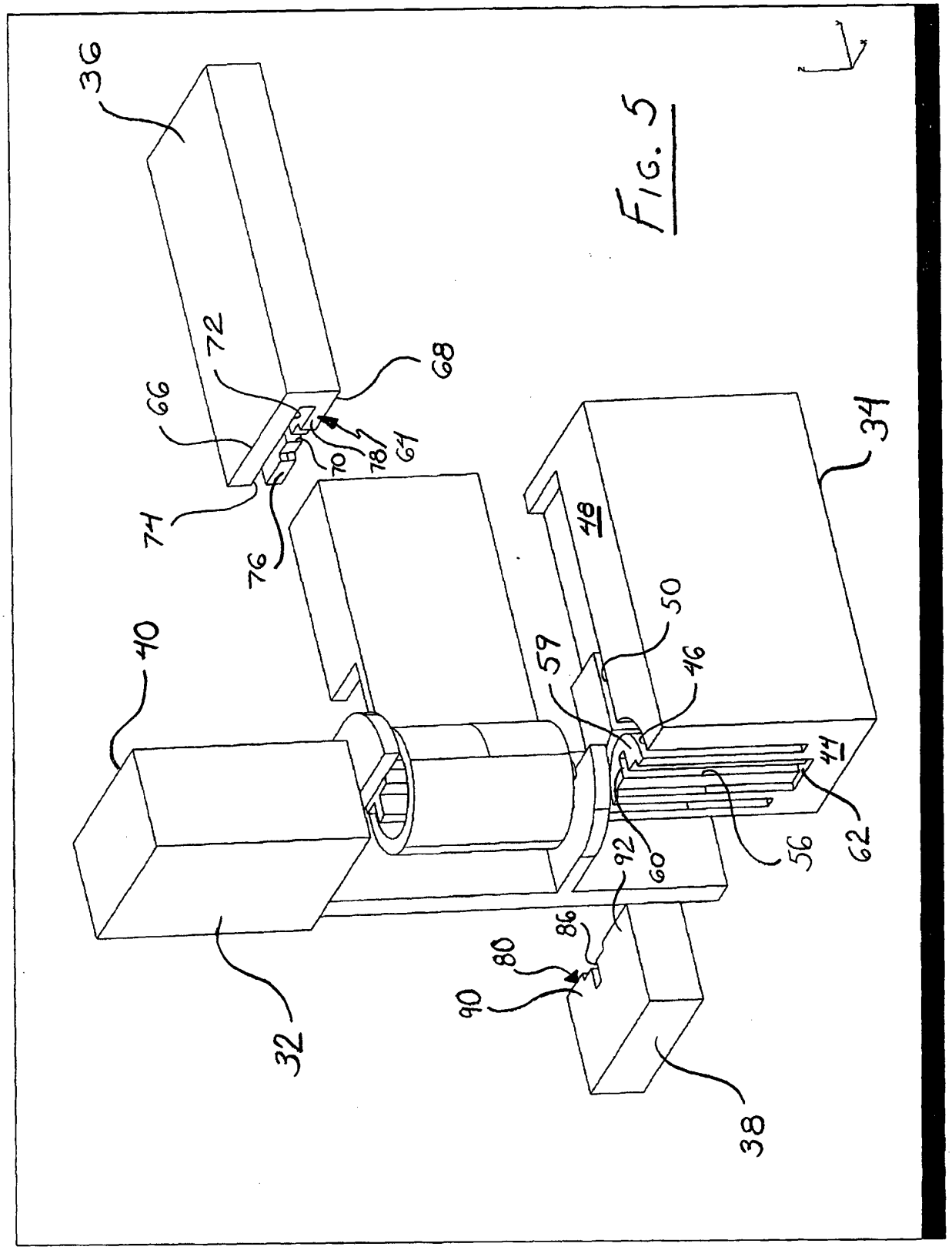
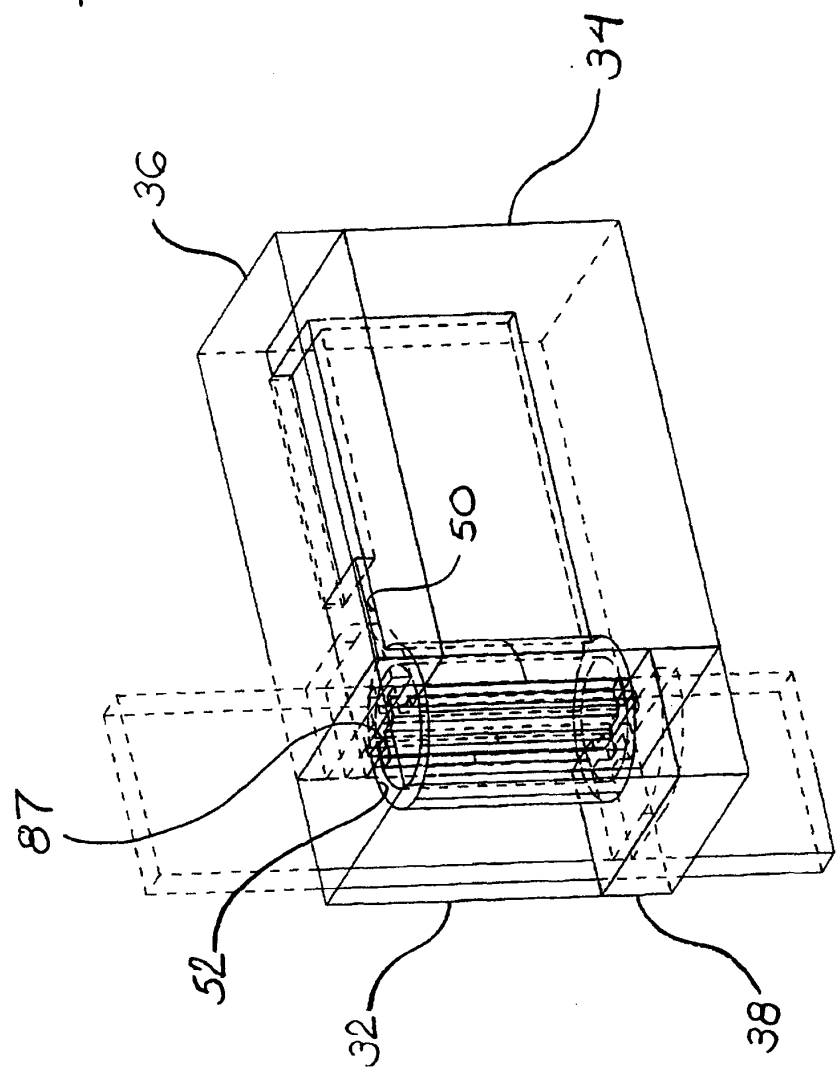

36
72
66
68
70
78
61
71
76
34
48
50
59
46
40
44
62
56
60
92
86
80
90
32
38

FIG. 5

FIG. 6



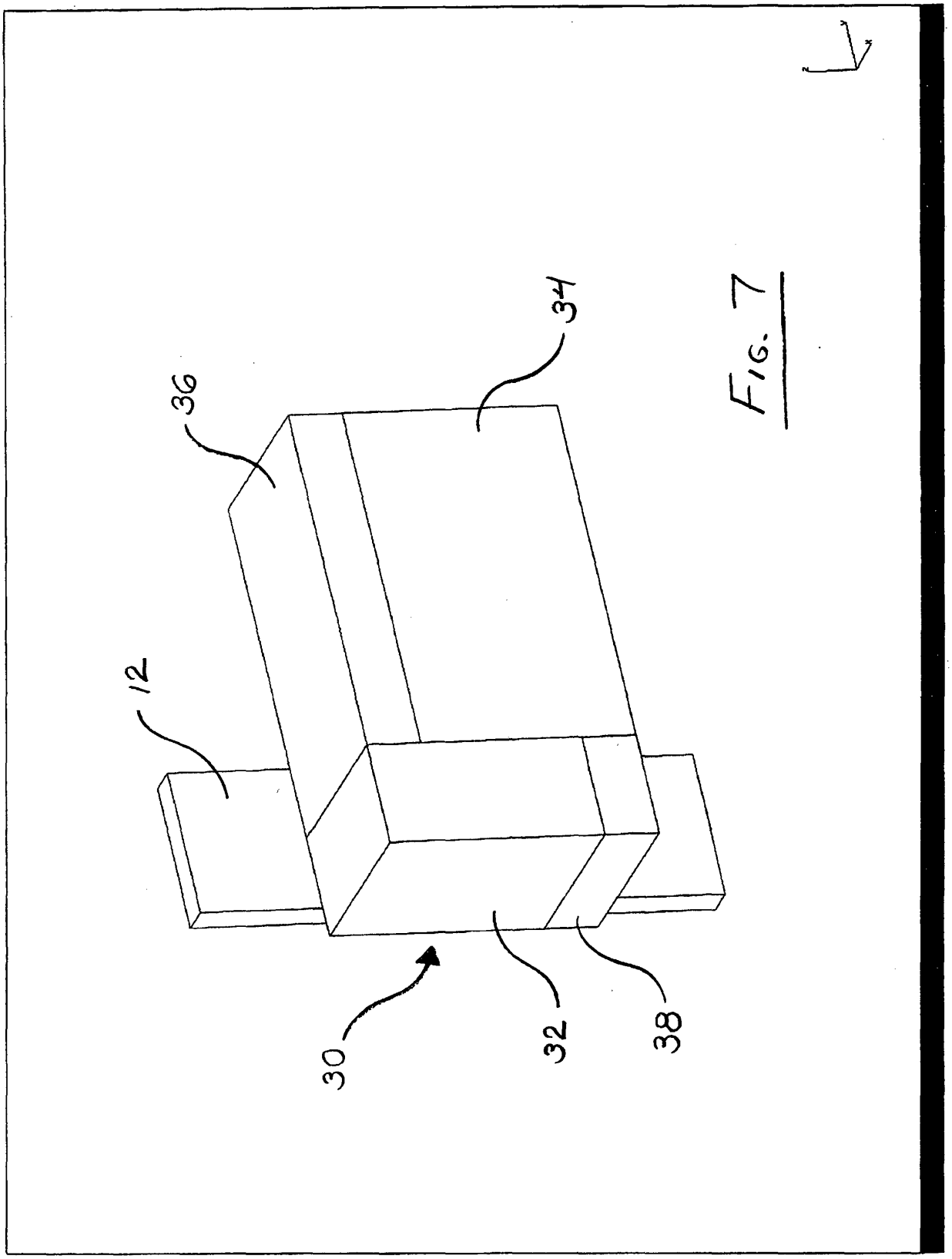
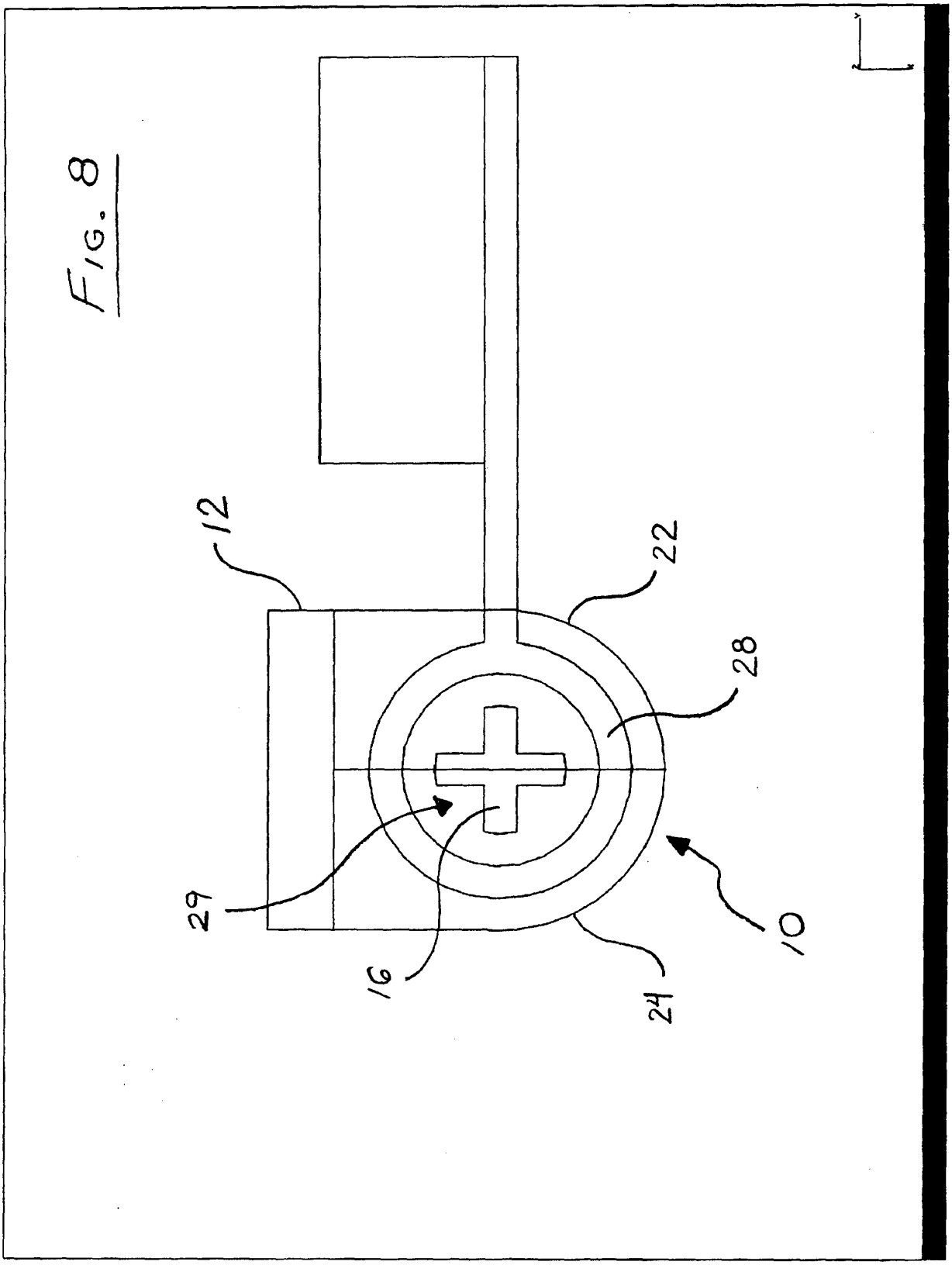


FIG. 7

FIG. 8



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 01L89795 A1 **[0003]**
- US 20040195721 A1 **[0004]**